

SUPER-FX

#103

SUPER-FX

#103

SA06550006B

fx-100v

fx-115v

fx-570A

fx-570C

fx-991v

120v

115v

570A

570C

991v

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Dear customer,
Thank you very much for purchasing our electronic calculator.

To fully utilize its features no special training is required, but we suggest you study this operation manual to become familiar with its many abilities. To help ensure its longevity, do not touch the inside of the calculator, avoid hard knocks and unduly strong key pressing. Extreme cold (below 32°F or 0°C), heat (above 104°F or 40°C) and humidity may also affect the functions of the calculator. Never use volatile fluid such as lacquer thinner, benzene, etc. when cleaning the unit. For servicing contact your retailer or nearby dealer.

Before starting calculation, be sure to press the $\square \text{ON}$ key and to confirm that "0." is shown on the display.

** Special care should be taken not to damage the unit by bending or dropping. For example, do not carry it in your hip pocket.*

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1/GENERAL GUIDE

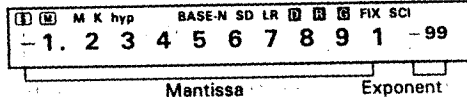
1-1 Modes

To put the calculator into a desired operating mode, or to select a specific angular unit, press **MODE** first, then **0**, **1**, ... or **9**.

- MODE 0** - COMP mode. Carry out ordinary arithmetic and functional calculations.
- MODE 1** - BASE-N is displayed. Carry out Binary/octal/decimal/hexadecimal conversions, calculations and logical operations.
- MODE 2** - LR is displayed. Calculate regression analysis.
- MODE 3** - SD is displayed. Calculate standard deviation.
- MODE 4** - **D** (with fx-100V, DEG) is displayed. Use degrees as the unit of angle measurement.
- MODE 5** - **R** (with fx-100V, RAD) is displayed. Use radians as the unit of angle measurement.
- MODE 6** - **G** (with fx-100V, GRA) is displayed. Use grads as the unit of angle measurement.
- MODE 7** - Press any number from 0 to 9 to indicate how many decimal places you want displayed (FIX is displayed).
- MODE 8** - Press any number from 1 (1 digit) to 0 (10 digits) to indicate how many significant digits you want displayed (SCI is displayed).
- MODE 9** - Releases instructions entered in **MODE 7** and **MODE 8**. This operation also changes the range of the exponent display (see page 7).

1-2 The display

(fx-115V/570AV/570CV/991V)



The display shows input data, interim results and answers to calculations. The mantissa section displays up to 10 digits. The exponent section displays up to ± 99 .

- E- or -C- Error indication (see page 11).
- S** Pressing of **SHIFT** (see page 113).
- M** Pressing of **MODE** (see page 6).

M

K

hyp
BASE-N
SD

LR

D or **R** or **G** - fx-115V/570AV/570CV/991V
(DEG or RAD or GRA - fx-100V)

FIX

SCI

45.12123.
12°3'45.6

Something is being stored in the memory (see page 111).
A constant is being used in calculations (see page 109).

Pressing of **hyp** (see page 164).
BASE-N mode (see page 129).
Standard deviation calculation (see page 176).

Regression analysis calculations (see page 183).

Angular unit (see page 162).
Decimal places of a displayed value is being designated (see page 168).
Significant digits of a displayed value is being designated (see page 168).
45.12123 (see page 120).
12°3'45.6" (see page 162).

■ Exponential Displays

The display can show calculation results only up to 10 digits long. When an intermediate value or a final result is longer, the calculator automatically switches over to exponential notation. Values greater than 9,999,999,999 are always displayed exponentially, while the lower limit is selectable. Note the following:

Type	Lower limit	Upper limit
A (Norm 1)	0.01	9,999,999,999
B (Norm 2)	0.000000001	9,999,999,999

Values less than the lower limits or greater than the upper limit shown above are displayed using exponential format.

Use the following procedure to switch between the Type A lower limit and the Type B lower limit:

- ① Check the display to see if the FIX or SCI symbols are shown, indicating that the number of significant digits or the number of decimal places have been specified. If either of the symbols is shown, press **MODE 9** to cancel the specification.
- ② Perform the following calculation: **1 ÷ 200 =**

- ③ Look at the display to see what the current lower limit is.

If the display reads:

5.⁻⁰³, the current setting is

Type A

5.⁻⁰³

If the display reads:

0.005, the current setting is

Type B

0.005

- ④ Press $\square \square \square \square$ to switch between the Type A and Type B lower limits.

*Note that the lower limit is not changed if you press $\square \square \square \square$ while the number of significant digits (SCI displayed) and/or the number of decimal places (FIX displayed) are specified. The first time you press $\square \square \square \square$, you clear the FIX and SCI specifications, and so you must press $\square \square \square \square$ again to change the lower limit.

2/ORDER OF OPERATIONS AND LEVELS

Operations are performed in the following order of precedence:

1. Functions
2. x^y , $x^{\frac{1}{y}}$, $R \rightarrow P$, $P \rightarrow R$, nPr , nCr
3. $\times$, $\div$
4. $+$, $-$

Operations with the same precedence are performed from left to right, with operations enclosed in parentheses performed first. If parentheses are nested, the operations enclosed in the innermost set of parentheses are performed first.

*Registers L_1 through L_6 are provided to store operations of lower precedence (including parenthetical operations). Since six registers are provided, calculations up to six levels can be retained.

*Since each level can contain up to three open parentheses, parentheses can be nested up to 18 times.

Example (4 levels, 5 nested parentheses)

Operation

2 $\square \square \square \square$ 3 + 4 $\square \square \square \square$ 5 + 4 $\square \square \square \square$ 3 $\square \square \square \square$

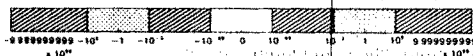
1 level 1 level 1 level 1 level

$\square \square \square \square$ 5 $\square \square \square \square$ 9 $\square \square \square \square$

Register contents at point A.

x	4
L_1	((((5 +
L_2	4 $\times$
L_3	(((((3 +
L_4	2 $\times$
L_5	
L_6	

3/CALCULATION RANGE AND SCIENTIFIC NOTATION



Normal display
Scientific notation

When the answer exceeds the normal display capacity, it is automatically shown by scientific notation, 10-digit mantissa and exponents of 10 up to ± 99 .

-1.234567891 -99

- ① The minus (-) sign for mantissa
- ② The mantissa
- ③ The minus (-) sign for exponent
- ④ The exponent of ten

The whole display is read:

-1.234567891 $\times 10^{-99}$

* Entry can be made in scientific notation by using the  key after entering the mantissa.

EXAMPLE	OPERATION	READ-OUT
---------	-----------	----------

$-1.234567891 \times 10^{-3}$
(= -0.001234567891)

1  234567891 	- 1.234567891
	- 1.234567891 00
3 	- 1.234567891 - 03

4/CORRECTIONS

If you notice an input mistake before you press the arithmetic operation key, simply press  to clear the value and enter it again.

In a series of calculations, you can correct errors in intermediate results by recalculating correctly when the error appears and then continuing with the original series from where you interrupted it.

You can also use the  key to backspace through an entered value until you reach the digit you wish to change and then make any necessary corrections. For example:

To change entry of 123 to 124

123	123.
	12.
4	124.

If you make a mistake by pressing the wrong key when entering , , ,  or , simply press the appropriate key to correct. In this case, the most recently pressed key operation is used, but it retains the order of precedence of the original operation entered.

5/OVERFLOW OR ERROR CHECK

Overflow or error is indicated by the "--E--" or "--C --" sign and stops further calculation.

Overflow or error occurs:

- When an answer, whether intermediate or final, or accumulated total in the memory is more than 1×10^{100} ("--E--" sign appears).
- When function calculations are performed with a number exceeding the input range ("--E--" sign appears).
- When the ranges for any of the number systems used in the BASE-N mode are exceeded. ("--E--" sign appears).
- When unreasonable operations are performed in statistical calculations ("--E--" sign appears).
- When the total number of levels of explicit and/or implicit (with addition-subtraction versus multiplication-division including x' and x'') nested parentheses exceeds 6, or more than 18 pairs of parentheses are used ("--C --" sign appears).

Ex.) You have pressed the  key 18 times continuously before designating the sequence of    .

To release these overflow checks:

- a), b), c), d) ... Press the  key.
- e) Press the  key. Or press the  key, and the intermediate result just before the overflow occurs is displayed and the subsequent calculation is possible.

Memory protection:

The content of the memory is protected against overflow or error and the accumulated total is recalled by pressing the  key after the overflow check is released by the  key.

6/POWER SOURCE

•fx-100V

One AA size manganese dry battery (UM-3) or R6P (SUM-3) gives approximately 17,500 hours continuous operation.

When battery power decreases, the whole display darkens. Battery should then be renewed. Be sure to switch OFF the power before changing.

•fx-570AV

One alkaline-manganese battery (LR54 (LR1130)) gives approximately 1,000 hours continuous operation (approx. 4,700 hours on type SR54 (SR1130)).

When battery power decreases, the whole display darkens. Battery should then be renewed. Be sure to switch OFF the power before changing.

•fx-570CV

One alkaline-manganese battery (LR44) gives approximately 2,700 hours continuous operation (approx. 10,000 hours on type SR44 (G-13) silver oxide battery).

When battery power decreases, the whole display darkens. Battery should then be renewed. Be sure to switch OFF the power before changing.

Battery replacement

(fx-100V/570AV)

1. Open the back panel of the unit by loosening the screws and remove dead battery.
2. Insert a new battery with polarity as indicated.
3. Replace the back panel.

(fx-570CV)

1. Open the battery compartment lid on the back of the unit and remove dead battery.
2. Insert a new battery with polarity as indicated.
3. Replace the battery compartment lid.

PRECAUTIONS

Incorrectly using batteries can cause them to burst or leak, possibly damaging the interior of the unit. Note the following precautions:

- Be sure that the positive (+) and negative (-) poles of the battery are facing in the proper direction.
- Never leave a dead battery in the battery compartment.
- Remove the battery if you do not plan to use the unit for long periods.
- Replace the battery at least once every 2 years, no matter how much the unit is used during that period.
- Never try to recharge the battery supplied with the unit.
- Do not expose batteries to direct heat, let them become shorted, or try to take them apart.

Should a battery leak, clean out the battery compartment of the unit immediately, taking care to avoid letting the battery fluid come into direct contact with your skin.

Keep batteries out of the reach of small children. If swallowed, consult with a physician immediately.

•fx-115V/991V

The CASIO C-POWER system makes it possible to operate calculators any place even in complete darkness; you don't have to worry about the light conditions.

- This unit protects memory no matter what the light conditions.
- This unit uses two power sources: an amorphous silicon solar cell, and a lithium battery (GR927).
- A weakened lithium battery is indicated when the memory contents spontaneously clear or when the display darkens under poor light conditions and cannot be restored by pressing the $\square$ key. Anytime such symptoms occur, the unit should be taken to your retailer or nearby dealer for battery replacement.
- Lithium battery replacement should only be performed by your retailer or an authorized dealer.
- To ensure proper operation the lithium battery should be replaced once every six years no matter how much the unit is used.

Auto power-off function

This unit automatically switches OFF if not operated for approximately 6 minutes. Power can be restored by pressing the $\square$ key. Memory contents and mode setting are retained even when power is switched off.

7/SPECIFICATIONS

BASIC OPERATIONS

4 basic calculations, constants for $+/-/ \times / \div / x^y / x^{1/y}$ AND/OR/XOR/XNOR, parenthesis calculations and memory calculations.

BUILT-IN FUNCTIONS

Trigonometric/inverse trigonometric functions (with angle in degrees, radians or grads), hyperbolic/inverse hyperbolic functions, common/natural logarithms, exponential functions (common antilogarithms, natural antilogarithms), powers, roots, square roots, cube roots, squares, reciprocals, factorials, conversion of coordinate system ($R \rightarrow P$, $P \rightarrow R$), permutations, combinations, random number, π , fractions, percentages, binary, octal, decimal and hexadecimal calculations and logical operations.

STATISTICAL FUNCTIONS

Standard deviation, linear regression, logarithmic regression, exponential regression, and power regression.

PHYSICAL CONSTANTS

— fx-570AV/570CV/991V

Speed of light in vacuum, Planck constant, Gravitational constant, Elementary charge, Electron rest mass, Atomic mass unit, Avogadro constant, Boltzmann constant, Molar volume of ideal gas at s.t.p.

MEMORY

1 independent memory and 6 constant memories.

CAPACITY

Entry/basic calculations

10-digit mantissa, or 10-digit mantissa plus 2-digit exponent up to $10^{\pm 99}$.

Fraction calculations

Total of integer, numerator and denominator must be within 10 digits (includes division marks).

Scientific functions Input range

$$\sin x / \cos x / \tan x \quad |x| < 9 \times 10^9 \text{ degrees} \\ (< 5 \times 10^7 \pi \text{ rad}, < 10^{10} \text{ gra})$$

$$\sin^{-1} x / \cos^{-1} x \quad |x| \leq 1$$

$$\tan^{-1} x \quad |x| < 10^{100}$$

$$\sinh x / \cosh x \quad |x| \leq 230.2585092$$

$$\tanh x \quad |x| < 10^{100}$$

$$\sinh^{-1} x \quad |x| < 5 \times 10^{99}$$

$$\cosh^{-1} x \quad 1 \leq x < 5 \times 10^{99}$$

$$\tanh^{-1} x \quad |x| < 1$$

$$\log x / \ln x \quad 10^{-99} \leq x < 10^{100}$$

$$e^x \quad -10^{100} < x \leq 230.2585092$$

$$10^x \quad -10^{100} < x < 100$$

$$x^y \quad \begin{cases} x > 0 \rightarrow -10^{100} < y \cdot \log x < 100 \\ x = 0 \rightarrow y > 0 \\ x < 0 \rightarrow y : \text{integer or } 1/2n + 1 \\ \quad (n : \text{integer}) \end{cases}$$

$$x^{1/y} \quad \begin{cases} x > 0 \rightarrow y \neq 0 \rightarrow -10^{100} < 1/y \cdot \log x < 100 \\ x = 0 \rightarrow y > 0 \\ x < 0 \rightarrow y : \text{odd number or } 1/n \\ \quad (n : \text{integer}) \end{cases}$$

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$$\sqrt{x} \quad 0 \leq x < 10^{100}$$

$$x^2 \quad |x| < 10^{50}$$

$$\sqrt[3]{x} \quad |x| < 10^{100}$$

$$1/x \quad |x| < 10^{100} (x \neq 0)$$

$$x! \quad 0 \leq x \leq 69 (x : \text{integer})$$

$$nPr / nCr \quad 0 \leq r \leq n, n < 10^{10}$$

$$nPr / nCr \quad (n, r : \text{positive integer})$$

*Certain combinations or permutations may cause errors due to overflow during internal calculations.

REC→POL

$$\sqrt{x^2 + y^2} < 10^{100}$$

POL→REC

$$|\theta| < 9 \times 10^9 \text{ degrees}$$

$$(< 5 \times 10^7 \text{ rad}, < 10^{10} \text{ gra}),$$

$$0 \leq r < 10^{100}$$

up to second

10 digits

*Errors are cumulative with such internal continuous calculations as x^y , $x^{1/y}$, $x!$, $\sqrt{\quad}$ so accuracy may be adversely affected.

*Output accuracy

± 1 in the 10th digit.

DECIMAL POINT

Full floating with underflow.

EXPONENTIAL DISPLAY

Norm 1 - $10^{-2} > |x|$, $|x| \geq 10^{10}$

Norm 2 - $10^{-9} > |x|$, $|x| \geq 10^{10}$

READ-OUT

Liquid crystal display, suppressing unnecessary 0's (zeros).

POWER SOURCE

•fx-100V

Power source: One AA size manganese dry battery (UM-3 or R6P (SUM-3))

Battery life: The unit gives approximately 17,500 hours continuous operation on type UM-3 or type R6P (SUM-3).

Power consumption: 0.00009 W

•fx-570AV

Power source: One alkaline-manganese battery (LR54 (LR1130)) or SR54 (SR1130))

Battery life: The unit gives approximately 1,000 hours continuous operation on type LR54 (LR1130) (4,700 hours on type SR54 (SR1130)).

Power consumption: 0.0001 W

•fx-570CV

Power source: One alkaline-manganese battery (LR44) or SR44 (G-13) silver oxide battery.

Battery life: The unit gives approximately 2,700 hours continuous operation on type LR44 (10,000 hours on type SR44 (G-13)).

Power consumption: 0.0001 W

•fx-115V/991V

Power source: Amorphous silicon solar cell, lithium battery (GR927)

Lithium battery life: 6 years with GR927 (1-hour daily use).

AMBIENT TEMPERATURE RANGE

0°C - 40°C (32°F - 104°F)

DIMENSIONS

•fx-100V 22.5mmH × 76mmW × 153mmD
($\frac{7}{8}$ "H × 3"W × 6"D)

•fx-115V 17.5mmH × 73mmW × 140mmD
($\frac{3}{4}$ "H × 2 $\frac{7}{8}$ "W × 5 $\frac{1}{2}$ "D)

•fx-570AV/570CV 10mmH × 73mmW × 140mmD
($\frac{3}{8}$ "H × 2 $\frac{7}{8}$ "W × 5 $\frac{1}{2}$ "D)

•fx-991V 8.5mmH × 73mmW × 140mmD
($\frac{5}{16}$ "H × 2 $\frac{7}{8}$ "W × 5 $\frac{1}{2}$ "D)

WEIGHT

•fx-100V 100 g (3.5 oz) including battery

•fx-115V 64 g (2.3 oz)

•fx-570AV 62 g (2.2 oz) including battery

•fx-570CV 66 g (2.3 oz) including battery

•fx-991V 59 g (2.1 oz)